TULAROSA BASIN

WATER SUPPLY AND ENERGY STUDY

PLAN OF STUDY

NEW MEXICO

WATER AND POWER RESOURCES SERVICE
SOUTHWEST REGION

MAY 1980

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PURPOSE

The Tularosa Basin Water Supply and Energy Study was funded under Water and Power Resources Service, Department of the Interior, General Investigations program in fiscal year 1980. The investigation is scheduled to be completed in fiscal year 1983.

The purpose of this Plan of Study is to provide information to study participants and other interested parties about the conduct, goals, and tasks of this study. Adjustments to this Plan of Study will be made as necessary.

PART I - INTRODUCTION

The Tularosa Basin is situated in south-central New Mexico. Principal communities are Alamogordo, Tularosa, and Carrizozo. Holloman Air Force Base, White Sands Missile Range, and a section of the Fort Bliss Army Reservation are situated within the basin.

The vast amounts of brackish and saline water which underlie the basin may represent a valuable water resource; and, in combination with the area's remote desert location, present a unique opportunity for water resources and energy-related development of importance to the southwest and the nation as a whole. In recent years several agencies have demonstrated an active interest in exploring the possibility of utilizing brine water for a power generation facility, perhaps in combination with desalting of water, for multipurpose uses. Past studies dealing with energy complex facilities in the basin have been based on assumptions that certain quantities of water can be feasibly extracted.

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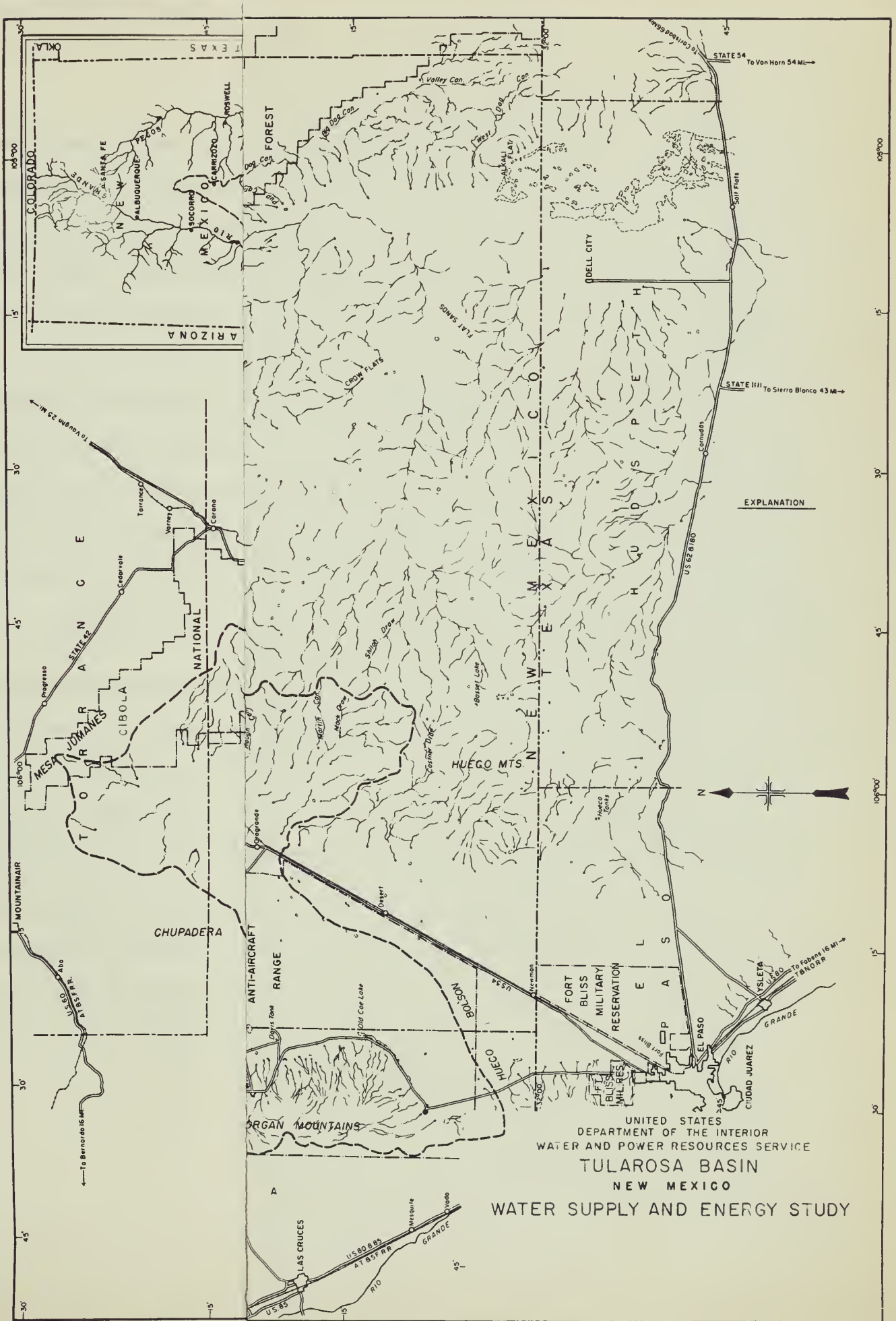
Sufficient data is lacking to verify aquifer characteristics and yield capability. Limited available data indicates that substantial amounts of clay could exist in portions of the basin where brackish water is present. Additional information must be obtained prior to developing plans for the development and utilization of the basin's fresh and saline water resources.

In addition to determining brine water availability, other data bases related to resource capability and problems and needs (local requirements), should be expanded, updated, and interrelated to obtain a comprehensive perception of the entire basin.

STUDY AREA

The Tularosa Basin lies within portions of Torrance, Lincoln, Socorro, Sierra, Dona Ana, and Otero Counties in south-central New Mexico. The basin covers 6,400 square miles of land and has no surface outlets. It is closed to surface flows on the east, west, and north by high mountain ranges. The southern boundary is defined by an indefinite high rise of mesquite-covered sandhills. The basin is elongated and extends north of the Texas-New Mexico State line about 170 miles. Maximum width is 60 miles. The study area is shown on the general map.

The principal municipality in the basin is Alamogordo with a current population of 29,800. Other smaller communities include Tularosa, Carrizozo, Orogrande, and La Luz. Adjacent major populated areas outside the basin include Las Cruces, New Mexico, 50,800 population, situated 70 miles southwest of Alamogordo; and the El Paso, Texas, Juarez, Mexico, area, 85 miles south with a combined metropolitan population of 900,000 (1975).


COLORADO
NEW MEXICO
TEXAS
OKLA
ARIZONA
SANTA FE
ALBUQUERQUE
PECOS
SOCORRO
CARRIZOZO
ROSWELL
RIO GRANDE
FOREST
Valley Can.
Dog Can.
West Dog Can.
ALKALI FLAT
FLAT SANDS
CROW FLATS
DELL CITY
Salt Flats
STATE 54
To Von Horn 54 Mi.
STATE 111
To Sierra Blanco 43 Mi.
Carrizozo
US 62 & 180
EXPLANATION
To Vaughn 25 Mi.
Torrance
Varney
Corona
Cedarvale
STATE 42
Progresso
MESA JUMANES
CIBOLA NATIONAL FOREST
Salida Draw
Bassett Lake
Hough Can.
Hackberry Can.
Mack Draw
Castile Draw
HUECO MTS.
Hueco Tanks
Orogrande
Desert
Newman
US 54
MOUNTAINAIR
CHUPADERA
ANTI-AIRCRAFT RANGE
Loop Tank
Old Car Lake
BOLSON
HUECO
FORT BLISS MILITARY RESERVATION
Fort Bliss
EL PASO
YSLETA
US 80
To Fabens 16 Mi.
TORNORR
RIO GRANDE
CIUDAD JUAREZ
FT. BLISS MIL. RES.
ORGAN MOUNTAINS
To Bernardo 16 Mi.
US 60
ATSFRR
Abo
LAS CRUCES
US 80 & 85
ATSFRR
Mesquite
Vado
RIO GRANDE
US 85
UNITED STATES
DEPARTMENT OF THE INTERIOR
WATER AND POWER RESOURCES SERVICE
TULAROSA BASIN
NEW MEXICO
WATER SUPPLY AND ENERGY STUDY

KEY MAP

ARIZONA
COLORADO
NEW MEXICO
TEXAS
MEXICO
SANTA FE
ALBUQUERQUE
FARMINGTON
GALLUP
RATON
ROSWELL
LAS CRUCES
EL PASO
PECOS
RIO GRANDE
TULAROSA BASIN

STUDY AREA BOUNDARY

EXPLANATION

LINCOLN NATIONAL FOREST
MESCALERO APACHE INDIAN RESERVATION
CAPITAN
US MARINE HOSPITAL RESERVATION
OLIVER LODGE RESERVOIR SITE
MESCALERO RESERVOIR SITE
SACRAMENTO MOUNTAINS
LINCOLN NO. NATIONAL FOREST (SACRAMENTO DIVISION)
CHAVES
ROSWELL
ARTESIA
DEXTER
HAGERMAN
DUNKEN
DELL CITY
JICARILLA MOUNTAINS
SIERRA BLANCA MOUNTAINS
RINGNADA RES. SITE
COBRIZO RES. SITE
HUECO MTS
CHUPADERA PLATEAU
SIERRA OSCURA MOUNTAINS
ORDNANCE
CALIFORNIA INSTITUTE OF TECHNOLOGY
ALAMOGORDO BOMBING RANGE
MISSILE RANGE
SOCORRO
SAN ANDRES MOUNTAINS
SAN ANDRES WILD-LIFE REFUGE
WHITE SANDS NATIONAL MONUMENT
WHITE SANDS MISSILE RANGE
FORT BLISS ANTI-AIRCRAFT MISSILE RANGE
FORT BLISS MILITARY RESERVATION
ORGAN MOUNTAINS
JORNADA EXPERIMENTAL RANGE
LAS CRUCES
EL PASO
CIUDAD JUAREZ
ISLETA
STATE 54 To Van Horn 54 Mi.
STATE 111 To Sierra Blanca 43 Mi.
To Tularosa 46 Miles
To Ruidoso 42 Miles
To San Antonio 13 Mi.
To Fabens 16 Miles
SCALE OF MILES 0 5 10 15 20

UNITED STATES
DEPARTMENT OF THE INTERIOR
WATER AND POWER RESOURCES SERVICE

TULAROSA BASIN
NEW MEXICO

WATER SUPPLY AND ENERGY STUDY

SETTING

The Tularosa Basin is an area of contrast. Pine-covered mountains rise abruptly to elevations of 9,000 feet with pinnacles extending to 12,000 feet. The 6,500-foot-elevation Mesa Jumanes forms a high plain that dominates the north half of the basin. The central and southern lowlands average about 4,000 feet in elevation and are covered with gypsum sands and alkali flats.

The vegetation of the basin floor consists of the typical desert types such as creosote, greasewood, mesquite, cacti, and chamisa. Native grasses cover a considerable portion of the basin and generally provide good grazing. Grains, several varieties of hay, and fruits are raised in the small irrigated valleys near the foothills. Many acres, outside of the central and western part of the basin, are fertile and could sustain irrigated agriculture if water were available.

The climate of the basin is characteristic of the arid southwest with normally clear skies and a dry atmosphere. Days are normally warm in both winter and summer, but the nights are cool. The large variations in elevation result in a great range in temperature. The maximum temperature recorded at Alamogordo, elevation 4,350 feet, is 109° F. and the minimum is -8° F. Strong spring winds frequently result in severe sandstorms. Precipitation generally occurrs in the form of torrential midsummer rainstorms. Annual precipitation averages about 6 inches in the low sandy desert area, about 10 inches along the foothills of the mountains surrounding the basin, and about 30 inches in the high mountains.

Areas of particular interest and importance are: (1) the White Sands National Monument located west of Holloman Air Force Base and U.S. Highway 70. The monument covers some 140,000 acres of gleaming white gypsum sands with dunes reaching 50 feet in height; and (2) the San Andres Wildlife Refuge which lies west of the White Sands National Monument in the San Andres Mountains.

DEVELOPMENT

Before 1940, the economy of the basin was based almost entirely on agriculture and livestock raising. Population growth was very slow.

The flat, isolated, central and western part of the basin was responsible for its selection by the military in the early 1940's for rocket and missile testing as well as atomic and similar material testing. The following military operations utilizing several square miles of area are now located within the basin: Fort Bliss Anti-Aircraft Range, White Sands Missile Range (previously known as White Sands Proving Ground), Ordnance California Institute of Technology, Alamogordo Bombing Range, and Holloman Air Force Base. They comprise what is known as the Integrated Missile Range. Population has greatly accelerated since the establishment of these military operations.

PART II APPROACH

Water and Power will seek the cooperation of and information from Federal, State, and local agencies; civic and special interest groups; and private citizens. Water and Power will solicit assistance and guidance to identify data gaps and determine proper direction that can lead to a useful product

without duplication of effort. Input from Federal, State, and local agencies will be required to carry out the major elements of this study. Such input will be readily welcomed by Water and Power. Involvement of interested publics will be solicited. Some of the study elements will be done within Water and Power's in-house organization while some work will be accomplished through contracts and agreements. Existing data will be utilized to the maximum extent possible where appropriate. Development of new data will be limited to quantification of water availability and water quality.

OBJECTIVES

The objectives of the Water and Power study will be to:

A. Improve the data base for determining the surface and ground water supply availability for multipurpose uses with emphasis on water-related energy development potentials.

B. Assess the resource capability of the basin in terms of water, land, geologic, environmental, cultural, solar, wind, and recreational resources.

C. Identify current and long-term (through year 2030) water and power needs within the basin and outside the basin. Water needs outside the basin will be limited to immediate adjacent areas within the State of New Mexico and the neighboring El Paso, Texas, metropolitan area. Power needs outside the basin will include those States intertied to the Western Loop.

D. Relate the resource capability of the basin for meeting and solving identified problems and needs.

STUDY ORGANIZATION AND MANAGEMENT

Water and Power will be responsible for conducting the overall study and coordinating with appropriate Federal, State, local agencies, and special interests groups; conducting public meetings; executing contracts; and preparing status and final reports.

PUBLIC AND INTERAGENCY INVOLVEMENT

During September and October of 1979, Water and Power personnel met with 54 key individuals in New Mexico in 15 separate meetings. The proposed study was explained and preliminary information was obtained relative to contacts, available data, concerns, constraints, and planning activities of other agencies. Results of the meetings are summarized below:

- Implemented process for coordination, cooperation, and avoidance of duplicative efforts,
- Identified data sources and knowledgeable contacts, and
- Indentified certain attitudes and concerns toward development and use of water and land resources

Followup meetings in January 1980, with 11 representatives of key agencies and institutions, focused on data gaps and program needs to fill gaps and assess existing and projected problems and needs within the Tularosa Basin.

This early involvement was used to scope the following plan for continued public participation:

Goals.--Provide for a broad representation of the public to participate in identifying and evaluating (1) problems and needs (local requirements), (2) available resources, (3) conceptual solutions, and (4) alternatives. These four goals coincide with the major items for decisionmaking.

Specific action.--Actions likely to be taken to insure accomplishment of the four public participation objectives are aimed at two levels of public-agency representatives and the general public. The program is arranged in four phases to maintain flexibility.

Phase One

° Distribute this "Plan of Study" and publish, through the media and State Clearing House agency a "Notice of Initiation of Investigation" to make the public aware of study. Interested parties may contact either of the following Water and Power Representatives:

Warren R. Weber, New Mexico Representative
Water and Power Resources Service
505 Marquette Avenue, NW.
Post Office Box 252
Albuquerque, NM 87103
Telephone (505) 766-2272

Nicolas Palacios, Project Coordinator
Water and Power Resources Service
714 South Tyler
Amarillo, TX 79101

° Meetings will be held with interest groups and agencies to inform of purpose and status of investigation, obtain feedback relative to concerns and attitudes, data needs, conceptual solutions, and other potential publics.

° It is anticipated that the first phase will primarily involve only Federal, State, and local agencies, elected officials, and organized groups until such time as some of the problems, needs, and conceptual solutions begin to be substantiated.

° At the end of the first and each succeeding year of study, a status report or information brochure will be prepared. This publication will include a description of public participation and results. Public meeting(s) will also be held to afford the general public an opportunity to become more acquainted with the study and to express concerns and ideas. Media releases will notify the public of meetings and publication releases.

Phase Two

° Participants expanded to include interested individuals and special interest groups. Participants to begin evaluating resources and conceptual solutions-media involvement.

° Water and Power personnel to continue meeting with interested groups on request.

° Wide distribution of status report or information brochure.

Phase Three

- Participants to assist in formulating and evaluating alternative plans. Potentially affected individuals invited to participate.

- Public meetings and media releases used to inform public of alternatives. Means provided for public to conveniently respond. Possibly establish public information center where public could make local contact (possible voluntary use of existing office or agency, maybe a civic group).

- Other means such as portable displays, open house sessions, evening or weekend meetings, exhibits, etc., may be used to facilitate public involvement.

Phase Four

- Prepare information brochure to inform public of "what was heard," "how it was used," and what decisions have been made by Water and Power. Media releases to inform of brochure availability.

- Timely preparation and release of project report (all participants, team members, and selected agencies given opportunity for field review). Media releases to inform public of report availability.

The participation level will undoubtedly vary among individuals as well as agencies depending on interest and impact. Active involvement would approximate attendance at working team sessions; possible field excursions for on-site evaluations; liaison with constituents; assistance in carrying out appropriate program policies and public involvement activities; assistance in making evaluations of critical public issues and program alternatives.

PART III COORDINATION WITH OTHER STUDIES

The Tularosa Basin has been of interest to several agencies involved in water and energy related activities. The principals involved have been the Water Resources Research Institute, New Mexico State University; Los Alamos Scientific Laboratory; Western Interstate Energy Board; Energy Institute, New Mexico State University and University of New Mexico; U.S. Geological Survey; and the Energy and Minerals Department (EMD), State of New Mexico.

The EMD was directed by the New Mexico State legislature in 1978* to assess the potential of the basin for the generation of electrical energy and the production of usable water. No time limit was set by the legislature for completing the assessment.

As part of Water and Power's study, all previous and on-going efforts will be reviewed and coordinated with all interests involved. Specific work items to be accomplished as part of this study will be structured in a manner to complement and possibly expand on previous and current efforts. Water and Power will strongly entertain cooperative programs for some of the study elements.

*House Bill 416 (712-7 USMSA 1978)

The towns of Carrizozo and Alamogordo are currently pursuing plans for establishing desalting plants for the production of municipal and industrial water. Neither of these involve electric power generation nor dual-purpose plants (power-potable water). Some work, commissioned by the State legislature, has been underway since 1978. A status report for the Alamogordo study is expected from the consultant* in the near future.

IV SUPPORTING STUDY ELEMENTS

The principal study elements will consist of (1) an assessment of the resource capability and (2) an assessment of the problems and needs. The findings of these two elements will be related during later phases of the study to identify options for meeting and solving identified needs.

A. RESOURCE CAPABILITY

A1-WATER

- Review previous surface and ground water supply availability and location.
- Differentiate between fresh (less than 1,000 mg/L**) and saline (1,000 to 35,000 mg/L) water.
- Suitability of supplies for various uses. Limitations.

* Herkenhoff and Associates, Albuquerque, New Mexico
**Milligrams per liter (roughly equivalent to parts per million)

° Conduct inventory to determine extent and level of data available.

° Identify data gaps.

° Identify program necessary to fill in data gaps.

° Identify and carry out "level one" program to assess fresh and saline ground water availability to the extent possible within budget constraints of this study. This assessment will probably be limited to conducting tests on existing holes and obtaining geophysical data. This information will provide better data to further evaluate aquifer characteristics and capabilities.

° Water and Power will update its own previous water supply studies performed in 1961 to determine water availability at Cabrizo, Mescalero, Rinconada, and other sites having a potential surface supply. These other sites could include stream systems on the western slopes of the Sacramento-Sierra Blanca range not previously evaluated.

° U.S. Geological Survey will outline a program to fully assess the most promising portions of the basin for water-energy related developments. This program will be defined in terms of money, time, effort, and specific work items as might be required. This information will be included as part of the final report. The purpose will be to provide anticipated expenditures if interest in the basin prevails.

A2-LAND

° Present land uses

° Ownership - military, private, Indian

° Irrigated land suitability

° Dry farm

A3-GEOLOGIC

° Coal resources, ownership location, and potential for development.

° Geothermal potential, location and type (wet or dry)

° Seismicity of area

° Other mineral resources, location and potential for development, i.e., gold in White Oaks area, natural gas, oil, and recovery of minerals from brine water.

A4-ENVIRONMENTAL

° Biological, flora and fauna

° Mountains and streams

° Lakes

° Open space

° Wildlife and wildlife refuge areas

A5-CULTURAL

° Archeological and paleontological resources

° Historical sites

° Scientific areas

A6-RECREATION

° Recreational areas

° Importance, accessibility

° Scenic areas

B. PROBLEMS AND NEEDS

This element will address current and projected problems and needs of the local communities, the basin, and outside the basin. Time frames for the study will be current through year 2030 in 25-year intervals, i.e., 1980-2005-2030. The principal focus will be on water-land-energy related issues. Latest available information will be used for all the subtasks.

B1-WITHIN THE BASIN

- Economic and demographic projections of communities within the basin including military installations.
- Statewide projections
- Present water supply sources for all uses such as municipal and industrial, irrigation, recreation, electrical power cooling, and other purposes
- Electrical power needs
- Flood control problems
- Economic factors, projections, employment, income, earnings, industrial categories, etc.
- Social assessment of the study region

B2-OUTSIDE THE BASIN

° Present and projected potable water needs of adjacent basin areas within the State of New Mexico and neighboring El Paso, Texas. Time frames will be current through year 2030 in 25-year intervals (1980, 2005, 2030).

° Present and projected electrical power needs in the Western Loop of the power grid system (includes the States of New Mexico, Arizona, California, Nevada, Utah, Wyoming, and Colorado). Power market studies should also include those portions of eastern New Mexico and west Texas that are not part of the Western Systems Coordinating Council power pool area. Time frames will be current through year 2030 in 25-year intervals (1980, 2005, 2030).

° Translation of the above electrical power needs to water requirement needs for power generation.

V PREPARATION OF REPORTS AND SUPPORTING DATA

Water and Power planning team members will prepare the supporting data for each subtask under elements A and B in their respective fields of expertise. Summaries of findings and data for each subtask will be compiled in separate working documents. These working documents will be made available to all team members including those agencies serving in an advisory role. Assumptions,

rationale, data basis, and analysis will be included. Detailed backup data will be included in appendixes or supporting data. The purpose of the working documents will be to provide a medium for exchanging ideas and reactions among study participants and for evaluating alternatives prior to preparation of the final report.

Water and Power's technical reports writer will prepare annual status reports, or information brochures and the draft and final reports. This will be done using input provided by team members. Release of these reports for public information will be subject to normal review procedures within Water and Power.

VI SCHEDULE AND KEY POINTS

FY 1980

Plan of Study

Notice of Initiation

Set Up Multiagency Advisory Team

Literature Research

Status Report/Information Brochure

Public Involvement Meeting(s)

FY 1981

Inventory of Resource Capability - Element A

Problems and Needs Assessment - Element B

Status Report/Information Brochure

Public Involvement Meeting(s)

FY 1982

Complete Inventory of Resource Capability - Element A

Complete Problems and Needs Assessment - Element B

Evaluate Resource Data

Develop Options

Constraints

Impacts

Status Report/Information Brochure

Public Involvement Meeting(s)

FY 1983

Draft Report

Review

Complete Report - (September 1982)

Public Involvement Meeting(s)